DC/DC Converter
F_N-1WR3 Series

MORNSUN®

1W isolated DC-DC converter
Fixed input voltage, unregulated single output

RoHS Patent Protection

Continuous Short Circuit Protection

3 years Warranty

CE Report EN 62368-1

UKCA Report BS EN 62368-1

CB IEC 62368-1

FEATURES

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range: -40℃ to +105℃
- High efficiency up to 85%
- I/O isolation test voltage: 3k VDC
- Industry standard pin-out

F_N-1WR3 series are specially designed for applications where an isolated voltage is required in a distributed power supply system. They are suitable for: pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits.

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load(μF) Max.
		Nominal (Range)	Voltage (VDC)	Current (mA) Max./Min.		
--	F0303N-1WR3	3.3 (2.97-3.63)	3.3	303/30	75/79	2400
	F0305N-1WR3		5	200/20	78/82	2400
EN/BS EN/IEC	F0503N-1WR3	5 (4.5-5.5)	3.3	303/30	70/74	2400
	F0505N-1WR3		5	200/20	78/82	2400
--	F0507N-1WR3		7.2	139/13	76/80	1000
EN/BS EN/IEC	F0509N-1WR3		9	111/12	79/83	1000
	F0512N-1WR3		12	84/9	79/83	560
	F0515N-1WR3		15	67/7	79/83	560
	F0524N-1WR3		24	42/4	81/85	220
EN/BS EN/IEC	F1203N-1WR3	12 (10.8-13.2)	3.3	303/30	71/75	2400
	F1205N-1WR3		5	200/20	76/80	2400
--	F1209N-1WR3		9	111/12	74/78	1200
EN/BS EN/IEC	F1212N-1WR3		12	83/9	76/80	560
	F1215N-1WR3		15	67/7	77/81	560
	F1224N-1WR3		24	42/5	77/81	220
--	F1505N-1WR3	15 (13.5-16.5)	5	200/20	76/80	2400
	F1509N-1WR3		9	111/12	76/80	1200
	F1515N-1WR3		15	67/7	77/81	560
EN/BS EN/IEC	F2403N-1WR3	24 (21.6-26.4)	3.3	303/30	69/75	2400
	F2405N-1WR3		5	200/20	73/79	2400
--	F2409N-1WR3		9	111/12	74/80	1200
EN/BS EN/IEC	F2412N-1WR3		12	83/9	75/81	560
	F2415N-1WR3		15	67/7	75/81	560
	F2424N-1WR3		24	42/5	75/81	220

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	3.3VDC input	3.3VDC output	--	384/12	405/--	mA
		5VDC output	--	370/12	389/--	
	5VDC input	3.3VDC/5VDC output	--	270/8	286/--	
		Other output	--	241/8	254/--	
Input Current	12V input	3.3VDC output	--	112/8	118/--	

(full load / no-load)		5VDC/9VDC/12VDC output	--	105/8	110/--	mA
		15VDC/24VDC output	--	103/8	109/--	
	15V input	5VDC/9VDC output	--	83/8	88/--	
		15VDC output	--	82/8	87/--	
	24V input	3.3VDC output	--	56/8	61/--	
		5VDC output	--	53/8	58/--	
		9VDC output	--	52/8	57/--	
		12VDC/15VDC/24VDC output	--	52/8	56/--	
Reflected Ripple Current*	Other intput		--	15	--	
	3.3VDC input		--	30	--	
Surge Voltage(1sec. max.)	3.3VDC input		-0.7	--	5	VDC
	5VDC input		-0.7	--	9	
	12VDC input		-0.7	--	18	
	15VDC input		-0.7	--	21	
	24VDC input		-0.7	--	30	
Input Filter			Capacitance filter			
Hot Plug			Unavailable			
Note: * Refer to DC-DC Converter Application Notes for detailed description of reflected ripple current test method.						

Output Specifications

Item	Operating Conditions			Min.	Typ.	Max.	Unit
Voltage Accuracy				See output regulation curves (Fig. 1)			
Linear Regulation	Input voltage change: ±1%		3.3VDC output	--	--	±1.5	--
			Other output	--	--	±1.2	
Load Regulation	10%-100% load	3.3VDC intput	3.3VDC output	--	13	20	%
			5VDC output	--	11	15	
		5VDC intput	3.3VDC output	--	15	20	
			5VDC/7.2VDC output	--	10	15	
			9VDC output	--	8	10	
			12VDC output	--	7	10	
			15VDC output	--	6	10	
			24VDC output	--	5	10	
		Other intput	3.3VDC output	--	8	20	
			5VDC output	--	5	15	
			9VDC/12VDC/15VDC output	--	3	10	
			24VDC output	--	2	10	
Ripple & Noise*	20MHz bandwidth		3.3VDC intput	--	50	100	mVp-p
		Other intput	24VDC output	--	50	100	
			Other output	--	30	75	
Temperature Coefficient	Full load			--	±0.02	--	%/℃
Short-Circuit Protection				Continuous, self-recovery			
Note: * The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.							

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output electric strength test for 1 minute with a leakage current of 1mA max.	3000	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ

Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	20	--	pF
Operating Temperature	Derating when operating temperature≥85℃, (see Fig. 2)	-40	--	105	℃
Storage Temperature		-55	--	125	
Case Temperature Rise	Ta=25℃	--	25	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
Storage Humidity	Non-condensing	5	--	95	%RH
Vibration	Full load, nominal input voltage	10-150Hz, 5G, 0.75mm, along X, Y and Z			
Switching Frequency	Full load, 3.3VDC intput	--	220	--	kHz
	Full load, 5VDC intput	--	270	--	
	Full load, other intput	--	260	--	
MTBF	MIL-HDBK-217F @ 25℃	3500	--	--	k hours

Mechanical Specifications

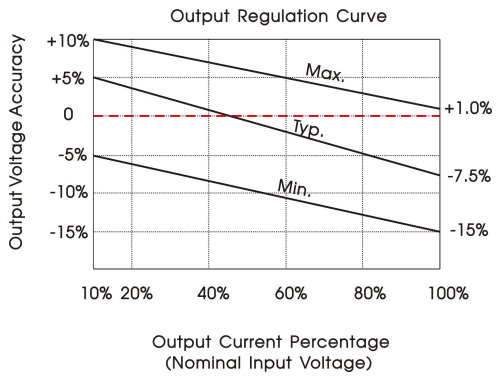
Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Dimensions	12.70 x 10.16 x 8.20 mm
Weight	1.8g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

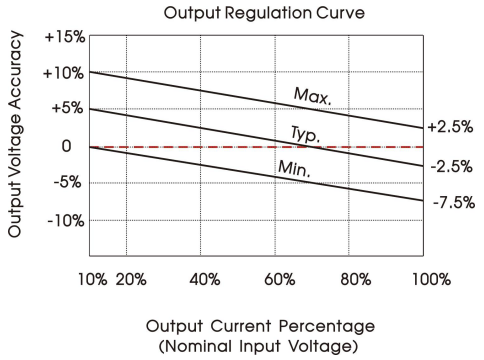
Emissions	CE	CISPR32/EN55032	CLASS B
	RE	CISPR32/EN55032	CLASS B
Immunity	ESD (5VDC intput)	IEC/EN61000-4-2	Air ±8kV, Contact ±4kV perf. Criteria B
	ESD (Other intput)	IEC/EN61000-4-2	Air ±8kV, Contact ±6kV perf. Criteria B
Note: Refer to Fig. 4 for recommended circuit test.			

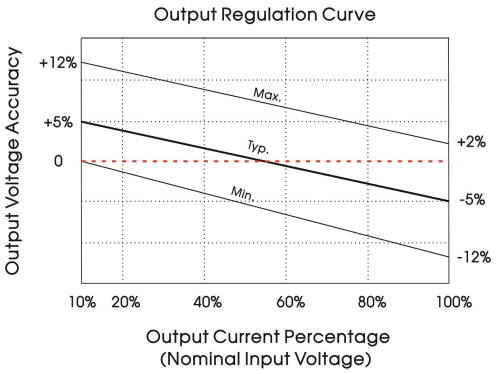
Typical Performance Curves

F0303N-1WR3



F0305N-1WR3/F05_N-1WR3 (Except F0503N-1WR3)





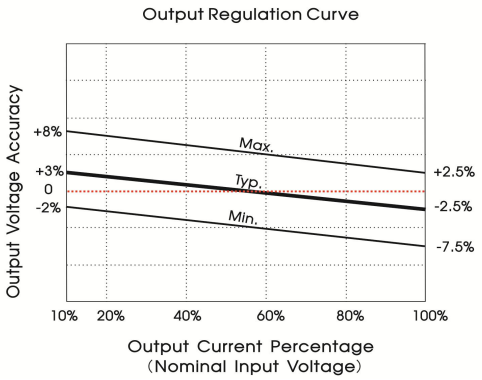


Fig. 1

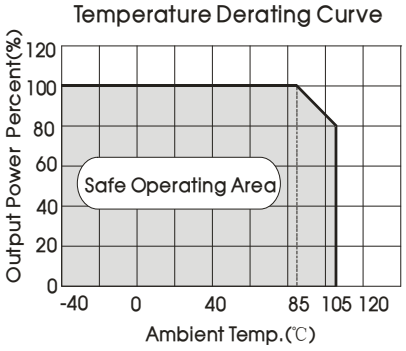
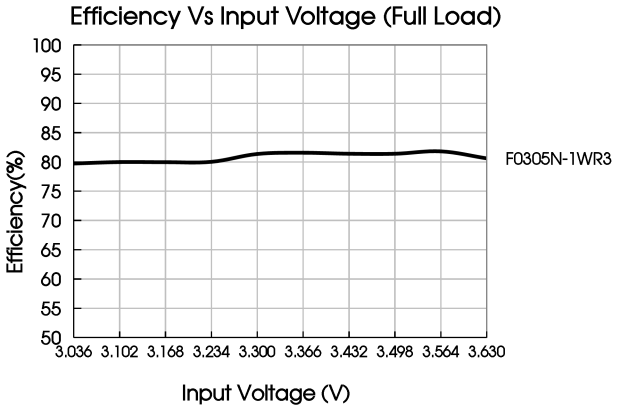
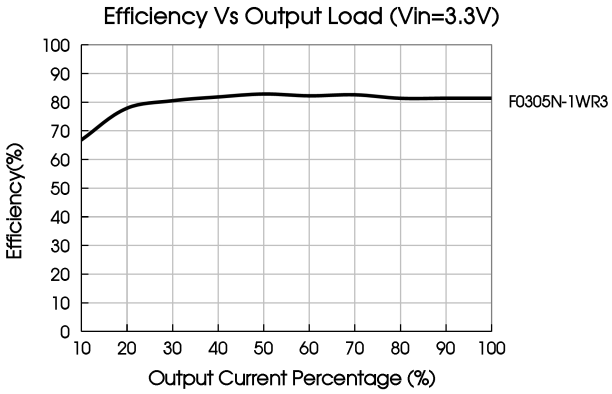
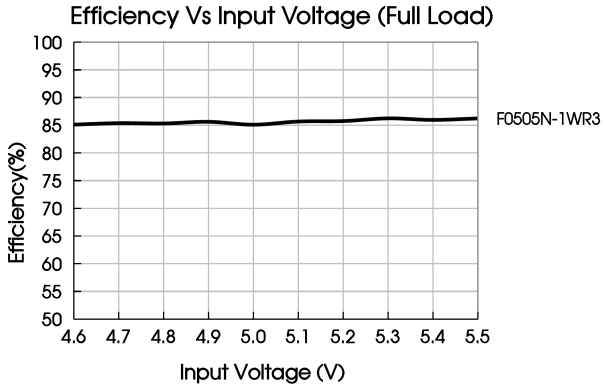
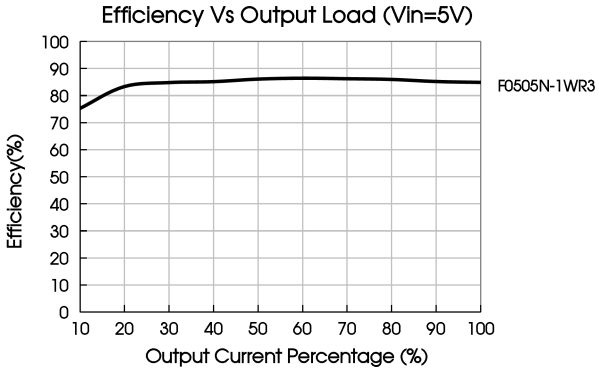


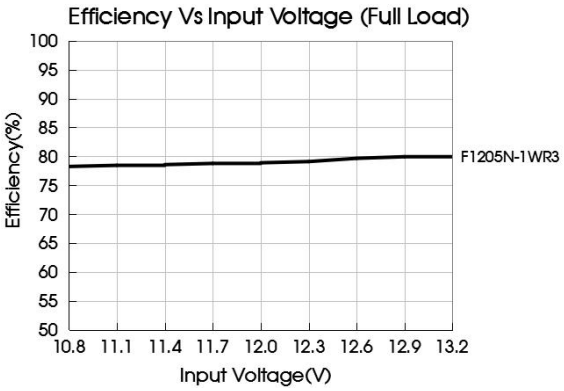
Fig. 2

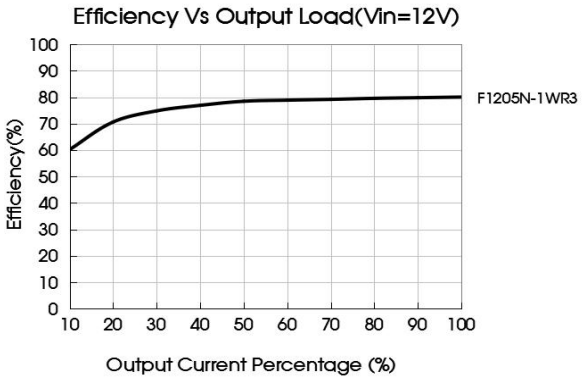


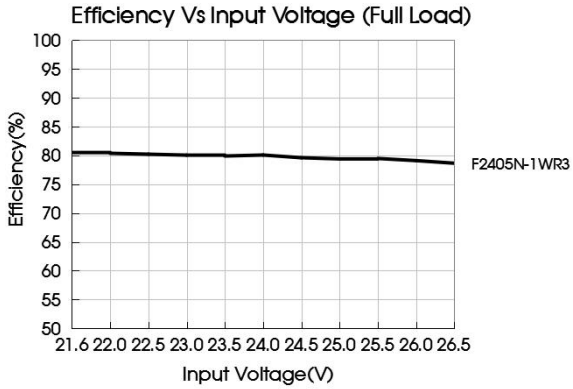


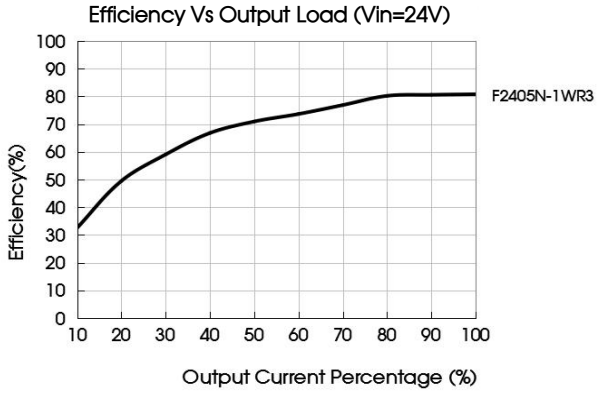












Design Reference

1. Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig. 3.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

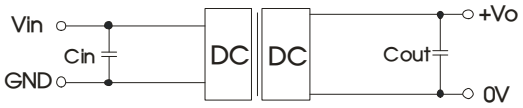


Fig. 3

Table 1: Recommended input and output capacitor values

Vin	Cin	Vo	Cout
3.3VDC	10μF/16V	3.3/5/7.2VDC	10μF/16V
5VDC	4.7μF/16V	9VDC	4.7μF/25V
12VDC	2.2μF/25V	12VDC	2.2μF/25V
15VDC	2.2μF/25V	15/24VDC	1μF/50V
24VDC	1μF/50V	--	--

2. EMC compliance circuit

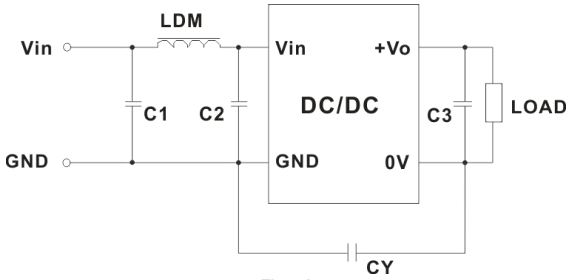


Fig. 4

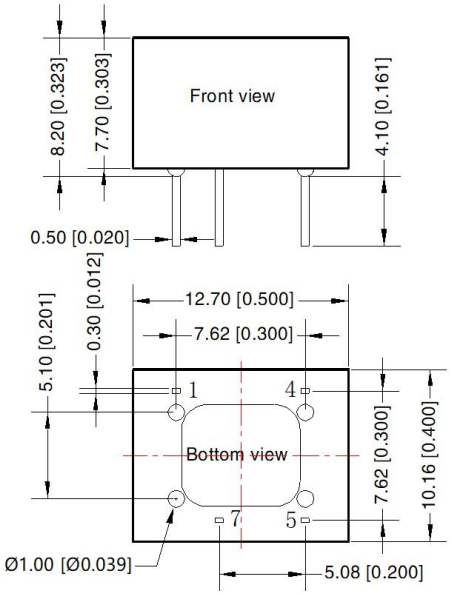
Table 2: Recommended EMC filter values

Input voltage		5VDC		Others
Output voltage		3.3/5/7.2/9VDC	12/15/24VDC	--
Emissions	C1/C2	4.7μF /25V	4.7μF /25V	4.7μF /50V
	CY	100pF/4kVDC	1nF /4kVDC	270pF /4kVDC
	C3	Refer to the Cout in table 1		
	LDM	6.8μH		

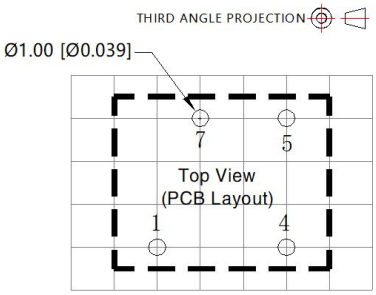
Note: In the case of actual use, the requirements for emissions are high, it is subject to CY.

3. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.25[± 0.010]



Note: Grid 2.54*2.54mm

Pin-Out	
Pin	Mark
1	GND
4	Vin
5	+Vo
7	0V

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200011;
2. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
5. All index testing methods in this datasheet are based on our corporate company standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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